ARE WIND-DRIVEN POWER PLANTS POSSIBLE?

P. Juchem

Translation of: "Sind Windkraftwerke Moeglich?,"
Koelnische Rundschau, No. 96a, 26 April 1953

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546 AUGUST 1974

STANDARD TITLE PAGE

1. Report No. NASA TT F-15,860	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle ARE WIND-DRIVEN POWER PLANTS POSSIBLE?		5. Report Date AUGUST 1974 6. Performing Organization Code
7. Author(s) P. Juchem		8. Performing Organization Report No. 10. Work Unit No.
9. Performing Organization Name and Address Techtran Corporation P.O. Box 729 Glen Burnie, Maryland 21061		11. Contract or Grant No. NASw-2485 13. Type of Report and Period Covered Translation
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, D.C. 20546		14. Sponsoring Agency Code

15. Supplementary Notes

Translation of: "Sind Windkraftwerke Moeglich?," Koelnische Rundschau, No. 96a, 26 April 1953

16. Abstract

A great deal has been written about the project to exploit wind energy to produce electrical energy. The controversy over the tremendous wind wheels has not died down, and, in the age of an evergrowing demand for energy, it has again become a subject of discussion. The following is a contribution to this subject and deals with the project of the Rheinland engineer Hermann Honnef. This report reflects the personal opinion of the author about the project.

17. Key Words (Selected by Author(s))	18. Distribution Statement
	Unclassified-Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified		

ARE WIND-DRIVEN POWER PLANTS POSSIBLE?

P. Juchem

When Honnef revealed to the Reich government in 1931 his plan to exploit the stronger and almost constant wind currents in the higher atmosphere zones by means of wind-driven power plants to produce electrical energy, he loosed a storm of indignation from the coal and energy producing interests. They saw themselves threatened by a competitor and were afraid that their investments were endangered.

Wind-driven power plants have a life expectancy of 3 to 5 times longer than thermal power plants and a greater degree of efficiency, said Honnef. Hydroelectric power plants vary according to the season in how much energy they put out and occasionally fail completely. They could only occasionally produce surpluses and still had a loss factor of 50%.

Thermoelectrical power plants could contribute to surpluses for accumulation but would have for this purpose only a 50% efficiency factor and would use twice as much coal for every hour they spent charging the condensors. Without storage capacity, however, no effective collection operations would be possible. The expense-free natural forces of wind and water supplement each other admirably so that the introduction of large wind-driven power plants would have very large economic significance for the overall economy, according to the view of the inventor of the wind-driven power plants.

240 Meter High Steel Towers

Honnef's plan is to set up on 240 meter high towers counter-rotating, hinged turbines without gears and with ridged blades the diameter of which would be 160 meters, and the nominal capacity would be 15,000 kilowatts. The average yearly capacity would be 40,000,000 kilowatt hours, which could be higher or lower depending on the height and the neighborhood in places — up to 80,000,000 for Brocken for example.

The implementation of the plan has been put off again and again. People cite and even today still cite the many individual attempts which have failed

financially, for instance on the Hueberg, at the Berlin Zoo, in the USA, and so forth. Its stability of the plant would be endangered, and there is also the possibility of ice buildup, or so goes the argument. The only thing which was agreed on was to make experiments at first on a small scale.

The best evidence that Honnef's plan is workable is the fact that Honnef was offered 40,000,000 Reichmarks by a foreign firm if 51% of the German patent rights could be obtained at the same time. Honnef refused.

As early as 1932 the VDI-Journal wrote about Honnef's experiment: "This is a deed for which we owe Honnef our thanks." Experiments with models in the Gottingen and Adlershof wind tunnels showed the first positive results of the gearless, counter-rotating machines designed by Honnef. His invention proved itself later on the large-scale experimental field of Boetzow-Velten near Berlin, when it ran for a full year. The original pictures of it show only a small section. Even in the wind tunnel trials it was shown that the feared danger of overspeed did not exist in reality, and the full-scale model showed it even better. Here all the influences of wind and water, ice and snow could be studied thoroughly, especially in the severe winter of 1941-1942. Wind measurements taken with sensitive instruments, polygraphs, and gust recorders were conducted, and the measurement results of the large meteorological stations were evaluated. Meteorologists saw no reason to worry about full-scale construction.

Honnef drew qualified men from technical schools and international firms, such as AEG and Siemens, to work with him on the problems which occurred in the areas of statics, electronics, equipment construction, aerodynamics, and energy conservation.

Honnef Built a Radio Tower at Koenigswusterhausen

The AEG confirmed that the experiments which had been made at the testing grounds of the counter-rotating 10,000 volt generator which they had built, had fulfilled their expectations. The company had therefore chosen to go ahead with building their counter-rotating 500,000-1,000,000 kilowatt hour generator, using this facility as a model. Although this larger power plant was finished in 1944, it could not be put into operation because of the air raids and was

lost because of Germany's collapse. The AEG, however, expressed their conviction that this generator would work just as flawlessly as the smaller model had.

None of the counter-rotating Honnef wind-driven power plants on the proving grounds broke down in all the years that they were in operation, as happened with the windmill attempts of individual researchers, whose work was mentioned at the beginning of the article.

When Honnef introduced the freestanding steel structure in Germany in the 20s, an attempt was made to make it look as impossible as one would like to today with this wind-driven power plant. Honnef intended to set his high towers on little porcelain blocks of about 20 cm X 30 cm. He was laughed at. After that Honnef invited the experts to an experiment in Berlin-Dahlem where the largest hydraulic press in Germany stood; its pressure was about 600 tons. While in operation, the press collapsed, but the porcelain remained whole. Then he was allowed a free hand. The large Honnef towers still stand in all the main radio parks of Germany, and at their head is our largest piece of construction work in the entire country and the largest independently suspended radio tower in the world altogether, the Honnef tower in Koenigswursthausen with a height of 274 meters. After it was constructed, the press reported about "the jewel of German technology."

Tower building is no longer a problem today. Building generators is even less a problem. The AEG was already building such generators with 75,000 kilowatt hour capacity. Authorities in steel building and electrotechnology, after long and careful checking of the calculations and the practical experiments, were no longer reluctant to attempt the construction on a large scale.

Because Honnef, however, since he had been a boy, had not followed the normal architectural paths in his bold construction ideas, which however always justified themselves after they were carried out, he had had to fight for every bit of recognition. The federal president recognized and praised his pioneer work in the area of steel tower construction and wind-driven power research, as well as his achievements in building bridges and other structures by awarding him the Great Order of Merit Cross. What Honnef wants today is certainly to take the next step towards making the great wind-driven power plant a

reality. A technological advance towards providing energy for the economy has become a pressing necessity. The water driven power plants, so widely accepted as self-evidently necessary today, have obviously not provided this progress. Even the natural power of water has had to fight a bitter battle to win its place in energy production.

40 Million Kilowatt Hours

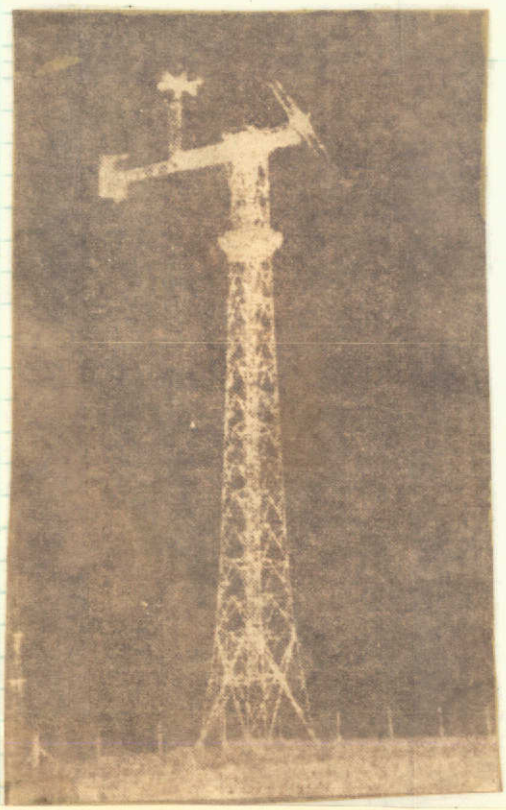
Doctor Poerscheke, Director of the Ministry, Privy Councillor, and Ph.D. in engineering, of the Finance Ministry of Nordrhein-Westfalen, who approved of Honnef's plan as far back as 1932 when he was a member of the Reich finance ministry and who died in 1952, discovered after the war that he could compare the invention of the wind-driven power plants by Honnef only with the other greatest technological inventions, such as the steam engine, the locomotive, and the car and reminds us of how much resistance these inventions encountered in their own time. Of greater interest, however, is what the present director of the great East Berlin power plant undertaking called Bewag, Professor Witte, discovered in a report in 1936 when he was a power management specialist. As he admits in his report, he had at his disposal for this project very complete data and documentation as well as a flawless and thoroughly conducted cost estimation report. Witte emphasizes the advantage of the wind-driven power plant and goes on to the conclusion that, with a generator capacity of 15,000 kilowatts, "on the average every year approximately 40,000,000 kilowatt-hours could be produced." He calls for an accelerated building program and says later in a work of the ETZ about the economy and practicality of building wind-driven power plants that the power plants can produce electrical energy efficiently only if "the facilities' capacities are very high"; but that the installation of such high capacities is sensible only if "the stronger and steadier winds at the higher altitudes can be exploited."

Outstanding Expert

Experience with small wind-driven machines and small wind-driven power plants is already available. The results: windmill-type blades are generally useless, while the solid blades of the counter-rotating turbine have held up for years until the events of war destroyed them. One could begin such a large undertaking today, but in any case, according to Honnef, one must begin the work where

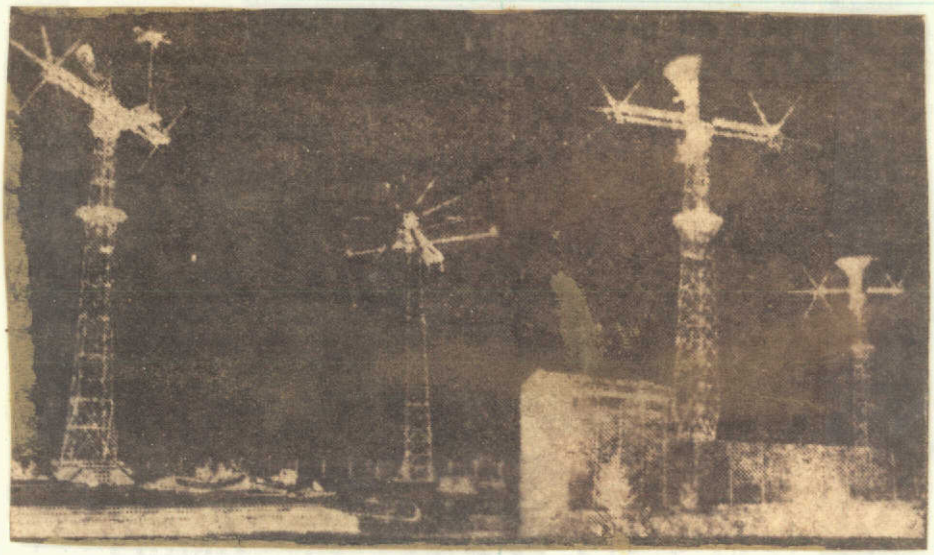
it was left off. That is the case with the 1,000 kilowatt hour generator. Honnef is the only engineer in the world who has had simultaneous experience in building high towers, had been doing research and development work for 30 years in the area of exploiting wind power, and who has 5 years experience in testing experimental power plants of differing capacities.

A true expert on works in the area of wind produced power, Doctor Robert Schoenhoefer, of Munich, declared in February "Honnef has made himself a name as a pioneer of technology and, as everyone knows, he has, in the structural development of the field, been able to assemble valuable and practical experience from the first wind tunnel experiments to the construction of power plants of varying capacities. I know that Honnef proceeded with scientific exactness and thoroughness. Honnef's wind-driven power plant is an electrical plant of a quite special and unique nature, a work of German inventiveness and German engineering, and there can be no objection to carrying it out on a large scale."



D.C. Power Plant "AEG" 10 Kilowatts, 40 Meters High.

Project Consisting of Several Wind-Driven Power Plants.



Wind-Driven Power Plants Which Have Been Tested Over a Long Period of Time. From 1940 to 1945 numerous installations were begun and in these installations the counter-rotating turbine with its automatic compensation for wind direction and with its electrical elements which were built into the rings between the blades sustained no damage even when being used under the strongest wind conditions and maintained its level of power. Of particular note was the fact that the turbines could start even with a very small amount of wind, between 0 and 1 meters per second. With a wind speed of between 3 and 3.5 meters per second, one attained here for the first time an energy production which exceed the installations' own energy consumption. With the energy produced the lighting, heating, and energy needs in the generator room, weather station, work shop, and hothouse were covered, and over and above that 200 light bulbs of 40 to 60 watt capacity were installed in the control room in order to show visitors how they burned without flickering. These installations were destroyed in 1945. Left hand picture: dual power plant 30 meters high and A.C. power plant 37.5 meters high. Right hand picture: dual power plants, D.C., one with a unipolar engine as a comparison basis. In the foreground stands the control room. In the background is the D.C. power plant.